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SINGLE QUARTZ GRAINS THERMOLUMINESCENCE DATING : AN APPROACH FOR THE COMPLEX MATERIALS

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1. INTRODUCTION

Certain materials which can be possibly dated by TL have a mixed quartzic composition : on the one hand the quartz grains may have not been all completely zeroed at the initial instant and on the second hand their geological origin is diversified. Hence, the individual TL comportments of the quartz grains coming out of the same sample may not be all adapted to TL dating. And those which are unadapted generally hinder the measurements.

2. METHODS

We propose to study the quartz grains one by one, when their TL output is intense enough and then carry on with those which show good TL characteristics :

- positive plateau test (first to second glow-curve)
- no sensitization to heating and irradiation
- no saturation
- negligible dose-rate effects.

A statistical study is then achieved with the results and the final aim is to have an automated procedure. The principle is in the exploitation of the great variability of quartz : if we often meet bad quartz (from the TL point of view), we can also sometimes find very good behaved quartz and the computer gives us the patience to seek after them.

3. RESULTS

We first tested the method "manually" with the datation of the maar of Saint-Hippolyte (Massif Central français).

A maar is the crater of a phreatomagmatic eruption in which a great variety of rocks were blown out by superheated steam during the ascension of fresh magma.

The problems are :

1. the geological origin of the quartz grains is diversified

2. some quartz grains may have been heated at a low temperature and poorly zeroed.

We encountered at least 10 types of natural glow-curves for the quartz grains extracted out of the pyroclastites. 50 % of the quartz grains were available for TL dating.

The final age was : Cler TL50 : 94 000 ± 14 000 B.1980. This result is in good agreement with the expected age following chronostratigraphy, associated fauna and palynology : end of the Riss-Würm interglacial period.

4. DISCUSSION

The problem that we face now is to design the "hard-ware". We are now thinking of some kind of automated TL reader roughly following the principle of Bøtter-Jensen (1978) with some modifications : adaptation to single grains and continuous processing.

5. CONCLUSION

The S.G.D. method appears to be a solution in the case of complex materials but we have also find it available for pot-sherds dating and it could be there a faithful method since the automation allows to use drastic conditions on a great number of grains.

References :

Bøtter-Jensen (1978) and J. Bundgaard, An automated reader for TL dating, PACT, vol. 2.